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10/539,604

06/17/2005

Peter Schoubye

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EXAMINER

WU, IVES J

ART UNIT

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1797

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | | |
|------------------------------|--------------------------------------|--|--|
| Office Action Summary | Application No. 10/539,604 | Applicant(s) SCHOUBYE ET AL. | |
| | Examiner IVES WU | Art Unit 1797 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 June 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>06/23/2008</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

(1). Applicants' Amendments and Remarks filed on 06/23/2008 have been received.

Claims 1 is amended. New claim 3 is added.

The rejections of claims 1-4 in prior Office Action dated 03/25/2008 are revised in response to the current Amendments.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

(2). **Claims 1-2, 4** are rejected under 35 U.S.C. 103(a) as being unpatentable over Mucenicks (GB-1499536) in view of Schoubye (US05108731A), evidenced by Hakka et al (US05017350), Thirion (US03953578).

As to a process for removal of SO₂ in off-gases having a temperature of 30-150° C and containing 0.001 – 1 vol % SO₂ in which SO₂ is oxidized to H₂SO₄ without the use of an absorption tower by spraying an aqueous solution of H₂O₂ into the off-gas upstream of an aerosol filter removing the product sulfuric acid from the off-gas in **independent claim 1**, Mucenicks (GB 1499536) discloses method of the removal of sulfur-containing gases present in a waste gas stream before the gases are released into the atmosphere (page 1, line 11-14). For example, sulfur-containing gases are present in effluent gas streams from flue gases, smelter gases, off-gases from chemical and petroleum processes (page 1, line 17-21). It comprises

contacting the waste gas stream with an **aqueous hydrogen peroxide** solution at a temperature above the freezing point but below the boiling point of the solution for a sufficient time to simultaneously absorb and oxidize the sulfur-containing gas (page 1, line 66-74). The reaction is preferably carried out between **25 to 85 °C**, which are the normal temperatures of waste gas streams. When oxidizing any of the gaseous organic sulfur compounds, temperatures between 60 to 70 °C are preferred (page 3, line 47-56). Generally, the sulfur-containing gas concentration is source-dependent and varies from a few mg/l to several percent (page 2, line 19-24). As demonstrated in Example 1, the gas stream containing **0.1% SO₂ by volume**, which reads on the limitation of SO₂ concentration of instant claim. The waste gas stream is contacted with the aqueous hydrogen peroxide solution in **any conventional contacting device** (page 3, line 65–67). Therefore, it would be obvious not to use absorption tower as claimed.

As to an aerosol filter removing the produced sulfuric acid from off-gas in **independent claim 1**, Mucenicks (GB 1499536) discloses to discharge directly into the environment (page 3, line 74-75). Mucenicks **does not teach** the aerosol filter downstream as claimed.

However, Schoubye (US05108731A) **teaches** filter in sulfuric acid process and apparatus (Title). An important method is to achieve a reduction of the escape of acid mist by passing the gas leaving each tube through an aerosol filter in gastight connection with the tube top (Abstract, line 10-14). As evidenced by Thirion (US03953578) that sulfuric aerosol is produced in the gaseous phase by the action of sulfuric anhydride on hydrogen peroxide vapour (Col. 4, line 62-64), furthermore, the reaction of SO₂ liquid + H₂O₂ liquid => H₂SO₄ dilute in droplet (Col. 4, line 52). Also evidenced by Hakka et al (US05017350) that, generally a coalescing means is provided at the exit from the contact zone to remove substantially all remaining, entrained liquid sorbent from the gases. Suitable coalescing means include demisters, centrifugal fans, chevrons and the like (Col. 6, line 5-10)

The advantage of using filter is to reduce the amount of acid mist escaping to environment to meet the continually increasing demands on environmental regulations and the sulfuric acid recovered is highly pure and highly concentrated (Abstract, line 8-10, 21-22).

Therefore, it would have been obvious at time of the invention to install the filter of Schoubye before the gaseous stream discharged into the environment as disclosed by Mucenicks in order to attain the above-cited advantage.

As to off-gas being cooled by evaporation of the water comprised in the solution being sprayed into the off-gas upstream of the filter in **claim 2**, in view of substantially identical process disclosed by prior arts and by applicants, the cooling effect would occur in the process of prior art.

As to off-gas having a temperature of 50-120° C and contains 100-1000 ppm SO₂ in **claim 4**, Muceniaks (GB 1499536) the reaction to be preferably carried out between **25 to 85 °C**, which are the normal temperatures of waste gas streams. When oxidizing any of the gaseous organic sulfur compounds, temperatures between 60 to 70 °C are preferred (page 3, line 47-56). Generally, the sulfur-containing gas concentration is source-dependent and varies from a **few mg/l** to several percent (page 2, line 19-24) which would include the range of SO₂ content as claimed.

(3). **Claim 3** is rejected under 35 U.S.C. 103(a) as being unpatentable over Muceniaks (GB 1499536) in view of Schoubye (US05108731A), further in view of Diep (US04678481), evidenced by Mortson et al (US20040062697A1).

As to wet electrostatic separator being used in place of an aerosol filter in **claim 3**, Muceniaks, Schoubye **do not teach** the wet electrostatic separator as claimed.

However, Diep (US04678481) **teaches** H₂O₂ as a conditioning agent for electrostatic precipitators (Title). As evidenced by Mortson et al (US20040062697A1) that a combination of wet flue gas desulfurization and wet electrostatic precipitation has been proposed and is effective at controlling both sulfur dioxide and sulfur trioxide ([0014], claim 11).

The advantage of using electrostatic precipitator is its efficiency of removal the high resistivity particulate matter by treating flue gases prior to contact with the electrostatic precipitator with an aqueous solution of hydrogen peroxide (Abstract).

Therefore, it would have been obvious to install wet electrostatic separator disclosed by Diep to replace the aerosol filter of Schoubye in combining with the process of Muceniaks in order to attain the above-cited advantage.

Response to Arguments

Applicant's arguments with respect to claim 1 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to IVES WU whose telephone number is (571)272-4245. The examiner can normally be reached on 8:00 - 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Duane Smith can be reached on 571-272-1166. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Examiner: Ives Wu

Art Unit: 1797

Date: September 2, 2008

/Duane S. Smith/
Supervisory Patent Examiner, Art Unit 1797
9-3-08